

# WHAT WE CLAIM

1. An image forming apparatus comprising at least:

a rotary, a rotary driving motor for rotating the rotary,  
a plurality of development units each of which is mounted  
5 to said rotary such that the development unit is replaceable  
at a replacement position and has a development roller for  
carrying developer and an input gear, a development unit  
driving motor for driving said development roller, a  
development unit driving gear which is disposed outside said  
10 rotary such that the development unit driving gear can be  
selectively meshed with one of said input gears and to which  
the driving force of said development unit driving motor is  
transmitted, and a control device for controlling the drive  
of said rotary driving motor and said development unit  
15 driving motor, wherein

during the image forming operation, said development  
rollers of the respective development units are set at the  
development position relative to a photoreceptor by turns  
according to the rotation of said rotary and, at the  
20 development position, said input gears of the respective  
development units are meshed with said development unit  
driving gear so as to drive said development rollers with  
the driving force of said development unit driving motor by  
turns, thereby achieving multi-color development,

25 said image forming apparatus being characterized by  
further comprising a rotary driving motor control means which  
controls said rotary driving motor for the rotation of said  
rotary during the non-image forming operation such that the

rotational speed of said rotary in a contact region where said input gear collides with said development unit driving gear is lower than the rotational speed of said rotary in a region other than said contact region.

5           2. An image forming apparatus as claimed in claim 1, being characterized in that the rotational speed of said rotary in the region other than said contact region during the rotation of said rotary in the non-image forming operation is set to be lower than the maximum speed of said  
10 rotary rotating during the image forming operation.

          3. An image forming apparatus as claimed in claim 1 or 2, being characterized in that an impact absorbing means for absorbing an impact generated when said input gear collides with said development unit driving gear during the  
15 rotation of said rotary in the non-image forming operation is provided on said development unit driving gear side.

          4. An image forming apparatus as claimed in any one of claims 1 through 3, being characterized in that the rotational speed of said rotary in the region other than said  
20 contact region during the rotation of said rotary in the non-image forming operation is set to a first speed corresponding to the rotational speed of the maximum torque ( $T_{\max}$ ) of said development unit driving motor and the speed of said rotary when any one of the input gears passes said  
25 contact region during the rotation of said rotary in the non-image forming operation is set to a second speed lower than said first speed.

          5. An image forming apparatus as claimed in any one

of claims 1 through 4, being characterized in that the rotation of said rotary during said non-image forming operation is at least one of a group consisting of the rotation of said rotary for setting the development unit to be replaced  
5 at said replacement position during the operation of replacing said development unit, the rotation of said rotary for resetting and initializing the phase of said rotary after power-on, the rotation of said rotary for initializing the phase of said rotary after sudden power-down, and the  
10 rotation of said rotary for moving to the home position after the final development procedure.

6. An image forming apparatus comprising a developing device of a rotary development type having a rotary on which a plurality of development units are mounted, and a locking  
15 means for positioning said rotary in order to selectively set said development units at a predetermined position and for locking the rotary at the predetermined position, wherein

said locking means comprises a lockable position formed on said rotary side, a locking member which is movably  
20 disposed on the body of the image forming apparatus and has a locking position where the locking member is engaged with said lockable position to lock said rotary and an evacuation position where the locking member is not engaged with said lockable position, a shifting means for shifting said locking  
25 member to said evacuation position, and a biasing means for biasing said locking member to said locking position,

said image forming apparatus being characterized in that said locking member has a contact portion which can come

in contact with said lockable position before the engagement with said lockable position according to the rotation of said rotary.

7. An image forming apparatus as claimed in claim 6,  
5 being characterized in that, in the driving means for said rotary, a driving pattern is set such that the rotary overruns said predetermined position when the driving means sets said rotary at the predetermined position.

8. An image forming apparatus as claimed in claim 6,  
10 being characterized by further comprising a driving motor for driving said development unit and said rotary, and a power transmission control means for conducting the transmission and isolation of the driving force of said driving motor to at least one of said development unit and said rotary.

15 9. An image forming apparatus as claimed in any one of claims 6 through 8, being characterized in that said locking member further has a standby position on said locking position side and wherein said locking member is set at said standby position before said locking member is engaged with  
20 said lockable position.

10. An image forming apparatus as claimed in any one of claims 6 through 9, being characterized in that said lockable position is composed of convexities formed on the rotary,

25 that said locking member is a lock lever which is movably disposed to the body of said image forming apparatus, and

that said lock lever has a concavity engageable with

one of said convexities and has a contact portion with which the convexity comes in contact before engaging said concavity according to the rotation of said rotary, and side walls of said concavity are each formed in an arc of a circle of which  
5 center is equal to the rotational axis of said lock lever.

11. An image forming apparatus as claimed in claim 10, being characterized in that said convexities are disposed corresponding to said development units, respectively,

that said convexities are positioning convexities for  
10 development for positioning said rotary at said development position and positioning convexities for replacement for positioning said rotary at said replacement position, and

that said lock lever has a concavity which can be selectively engaged with one of said convexities and has a  
15 contact portion with which the convexity comes in contact before engaging said concavity according to the rotation of said rotary.

12. An image forming apparatus as claimed in claim 11, being characterized in that the interval in the  
20 circumferential direction between said positioning convexity for development and said positioning convexity for replacement for one development unit is set to be smaller than the interval in the circumferential direction between said positioning convexity for replacement for said one  
25 development unit and the positioning convexity for development for the next development unit.

13. An image forming apparatus as claimed in any one of claims 10 through 12, being characterized in

that the end of said each convexity is formed in an arc shape,

that said contact portion is an inclined face with which the arc-shape end of said convexity can come in contact,  
5 wherein the start point of said inclined face is formed on an arc of a circle of which center is equal to the rotational axis of said rotary and which passes the ends of said convexities, and

that, according to the rotation of said rotary, said  
10 convexity comes in contact with said inclined face and presses said inclined face before said convexity is engaged with said concavity.

14. An image forming apparatus as claimed in any one of claims 6 through 13, being characterized in that said  
15 shifting means is a solenoid.